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EXAMINER	
FUJITA, KATRINA R	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/776,736	DEWAELE, PIET	
	Examiner	Art Unit	
	KATRINA FUJITA	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 November 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-5,7-9,13,15-17 and 20-23* is/are pending in the application.

4a) Of the above claim(s) *17,20 and 21* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-5,7-9,13,15,16,22 and 23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on November 14, 2008 has been entered.

Response to Amendment

2. This Office Action is responsive to Applicant's remarks received on November 14, 2008. Claims 1, 3-5, 7-9, 13, 15-17, 20, 21 and newly added 22 and 23 remain pending.

Claim Objections

3. The previous claim objections have been withdrawn in light of Applicant's amendment.

Claim Rejections - 35 USC § 101

4. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

5. Claims 1, 3,-5, 7-9, 15, 16, 22 and 23 are rejected under 35 U.S.C. 101 as not falling within one of the four statutory categories of invention. Supreme Court precedent[1] and recent Federal Circuit decisions[2] indicate that a statutory "process" under 35 U.S.C. 101 must (1) be tied to another statutory category (such as a particular apparatus), or (2) transform underlying subject matter (such as an article or material) to a different state or thing. While the instant claim recites a series of steps or acts to be performed, the claim neither transforms underlying subject matter nor is positively tied to another statutory category that accomplishes the claimed method steps, and therefore does not qualify as a statutory process. For example the orientation determination method including steps of determining, performing, quantizing, weighted voting and selecting is of sufficient breadth that it would be reasonably interpreted as a series of steps completely performed without a machine. The Applicant has provided no explicit and deliberate definitions of "determining", "performing", "quantizing", "weighted voting" or "selecting" to limit the steps to the electronic form of the "image,"

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[1] *Diamond v. Diehr*, 450 U.S. 175, 184 (1981); *Parker v. Flook*, 437 U.S. 584, 588 n.9 (1978); *Gottschalk v. Benson*, 409 U.S. 63, 70 (1972); *Cochrane v. Deener*, 94 U.S. 780, 787-88 (1876).

and the claim language itself is sufficiently broad to read on manually calculating the curvature on a piece of paper.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 1, 3, 8, 13, 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Chang et al. ("Radiology Image Orientation…", SPIE Conference on Image Display, which incorporates Glicksman et al. ("Architecture of a High Performance PACS…", Proceedings SPIE)), Goris (US 5,970,182) and Wuescher et al. ("Robust Contour Decomposition…", IEEE Article).

Regarding **claim 1**, Chang teaches a method to be employed by a computer of determining the orientation of an image ("radiology image orientation processor for workstation display" at section 1, line 3; "image orientation processor is meant to evolve into operational software" at section 2, paragraph 7, line 1) characterized in that the

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[2] *In re Bilski*, 88 USPQ2d 1385 (Fed. Cir. 2008).

orientation is deduced from a digital representation of the image (“image orientation of digital X-ray images” at section 1, line 4).

Chang does not disclose that the orientation is determined from direction and magnitude of normal vectors associated with local curvature in a set of points.

Goris teaches a method of determining the orientation of an image comprising determining the orientation (“orientation and curvature information” at col. 7, line 45) from direction and magnitude of normal vectors ("where (nx, ny, nz) is the normal vector of S2 at N, and (nx”, ny”, nz") is the normal vector of S1" at M"" at col. 7, line 43) associated with local curvature in a set of points (figure 9B).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to utilize the normal vector information of Goris to further define the orientation of Chang to "provide a reliable, operator independent method for the analysis and interpretation of organ images" (Goris at col. 4, line 46).

The Chang et al. and Goris combination teaches the elements of claim 1 as shown in the 103 rejection above.

The Chang et al. and Goris combination does not teach computing first and second derivative vectors, quantizing the direction and magnitude of computed first and second derivative vectors, weighted voting of quantized first and second derivative directions into analyzing coordinate system orientations so as to determine a maximum vote and selecting the orientation having the maximal vote.

Wuescher et al. teaches a method in the same field of endeavor of curvature representation ("extracts extended, contiguous, constant curvature segments at several layers of detail" at page 42, right column, paragraph 1, line 5) comprising:

performing a first and second derivative vector computation for one or more pixels of said digital representation (see equation 3.2 on page 43);

quantizing the direction and magnitude of computed first and second derivative vectors (see equation 3.1 on page 43);

weighted voting of quantized first and second derivative directions into analyzing coordinate system orientations so as to determine a maximum vote ("Each point casts votes for all curvature values with +/-tc of its own. We quantize curvature into bins of width 0.01" at page 45, section B, line 11; figure 10); and

selecting the orientation having the maximal vote ("peaks of the resulting histogram represent the curvature values most likely to fit the longest horizontal segments of the curvature plot" at page 45, section B, line 15).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to utilize the curvature representation of Wuescher et al. to express the contours of the Chang et al. and Goris combination to provide "Stability with respect to local perturbations in the curve arising from either noise in the image or anomalies of the edge detection process" (Wuescher et al. at page 42, right column, paragraph 1, line 10).

Regarding **claim 3**, Chang teaches a method wherein the digital representation is an edge representation ("digital chest image is first read in by the algorithm and then segmented into a binary image" at section 3A, paragraph 1, line 1).

Regarding **claim 8**, Chang teaches a method wherein direct exposure areas are excluded from the digital representation ("pixels in lungs as well as the area outside the body are assigned to be 0" at section 3A, paragraph 3, line 7).

Regarding **claim 9**, Chang teaches a method wherein an image is subjected to an orientation modifying geometric transformation ("If the side image is rotated by 90° or -90°, the algorithm will rotate the image" at page 292, paragraph 6, line 1) to yield a desired orientation of the image ("the algorithm assigns the image with notations such as HA, HP, FA or FP" at page 292, paragraph 6, line 2; "the notation used by the algorithm to indicate the patient's orientation" at section 2, paragraph 5, line 2).

Regarding **claim 13**, Glicksman teaches a computer readable carrier medium ("image processing card provides up to 65 MBytes of high speed buffer storage" at section 4, paragraph 4, line 3).

Regarding **claim 15**, Goris discloses a method wherein said orientation is deduced from an addition vector of said normal vectors (equation at col. 7, line 37).

Regarding **claim 16**, Chang discloses a method wherein said image is represented by an iso-intensity representation ("segmented into a binary image" at section 3A, paragraph 1, line 2).

8. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Chang et al., Goris and Wuescher et al. as applied to claim 1 above, and further in view of Uppaluri (US 2003/0215119).

The Chang et al., Goris and Wuescher et al. combination teaches the elements of claim 1 as shown in the 103 rejection above. The Chang et al., Goris and Wuescher et al. combination also discloses that the image is a thoracic image ("chest images" Chang et al. at section 1, line 4), the method further comprising determining curvature ("Computing curvature" Wuescher et al. at page 43, section A, line 1).

The Chang et al., Goris and Wuescher et al. combination does not teach curvature being determined of ribs or the ribcage.

Uppaluri discloses a method in the same field of endeavor of medical image analysis ("method and system for computer aided detection and diagnosis of dual energy ("DE") or multiple energy images" at paragraph 0001, line 3) wherein curvature is calculated ("region of interest statistics such as shape, size, density, curvature can be computed" at paragraph 0034, line 8; figure 6, numeral 230) which is used in a CAD algorithm ("candidate regions are then classified based on features extracted from the corresponding complete image set" at paragraph 0042, line 7; figure 11, numeral 340) on areas that include the ribs ("edges outside the ribs" at paragraph 0046, line 9).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the orientation processor of the Chang et al., Goris and Wuescher et al. combination using the feature extraction taught by Uppaluri as described above, "to separate the edges inside the ribs from the edges outside the ribs,

as edges inside the ribs are candidates for fractures" (Uppaluri at paragraph 0046, line 8) and subsequently provide for incorrect image orientation.

9. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Chang et al., Goris and Wuescher et al. as applied to claim 1 above, and further in view of Abdel-Mottaleb (US 5,572,565).

The Chang et al., Goris and Wuescher et al. combination teaches the elements of claim 1 as shown in the 103 rejection above, wherein a curvature is calculated ("Computing curvature" Wuescher et al. at page 43, section A, line 1).

The Chang et al., Goris and Wuescher et al. combination does not teach a mammographic image and curvature is calculated for skin border edge segments of the image.

Abdel-Mottaleb discloses a method in the same field of endeavor of medical image analysis ("method of and system for segmenting digital mammograms" at col. 3, line 56) wherein curvature is calculated for skin border edge segments ("segment of the skinline of greatest curvature is selected" at col. 4, line 36) of a mammographic image ("digital mammograms" at col. 3, line 57) to detect the nipple in the image ("detected reference point corresponding to the nipple" at col. 7, line 45).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the orientation processor of the Chang et al., Goris and Wuescher et al. combination using the skinline extraction taught by Abdel-Mottaleb as

described above, to "assure that equal amounts of tissue, between skinline and chest wall, are visualized in all views taken" (Abdel-Mottaleb at col. 2, line 58).

10. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Chang et al., Goris and Wuescher et al. as applied to claim 1 above, and further in view of Pietka ("Image Standardization in PACS", Handbook of Medical Imaging).

The Chang et al., Goris and Wuescher et al. combination teaches the elements of claim 1 as shown in the 103 rejection above.

The Chang et al., Goris and Wuescher et al.combination does not teach excluding collimation areas from the digital representation of the image.

Pietka discloses a method in the same field of endeavor of medical image enhancement ("image content adjustment to make images more readable…in preparation for medical diagnosis" at section 1, paragraph 2, line 6) wherein collimation areas are excluded from an image ("removal of collimator-caused background" at section 2, paragraph 2, line 3).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the orientation processor of the Chang et al., Goris and Wuescher et al. combination using the background removal taught by Pietka as described above, to provide "lossless data compression" (Pietka at section 2.1, paragraph 5, line 3).

11. Claims 22 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Chang et al., Goris and Wuescher et al. as applied to claim 1 above, and further in view of Pulsipher et al. (US 5,943,446).

Regarding **claim 18**, the Chang et al., Goris and Wuescher et al. combination discloses a method wherein said image is a 2D image (“image size is 440 x 535" Chang et al. at page 287, section A, paragraph 2, line 3).

The Chang et al., Goris and Wuescher et al. combination does not disclose that said direction and magnitude of the computed first and second derivative vectors are quantized according to four Cartesian plane quadrants.

Pulsipher et al. teaches a method in the same field of endeavor of image vector quantization (“method of increasing the speed of performing a full code book search during vector quantization" at col. 1, line 10) wherein said direction and magnitude of the computed vector is quantized (“must determine the quadrant of the first four axis system in which the text vector lies" at col. 6, line 64; “sublists associated with each of the cells of the lattice which covers a full image being quantized” at col. 2, line 11) according to four Cartesian plane quadrants (“four axis coordinate system 68” at col. 6, line 52).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to utilize the four axis coordinate system of Pulsipher et al. to quantize the first and second derivative vectors of the Chang et al., Goris and Wuescher et al. combination as it "greatly increases the speed of a full code book search" (Pulsipher et al. at col. 1, line 44).

Regarding **claim 19**, the Chang et al., Goris and Wuescher et al. and Pulspiher et al. combination discloses the elements of claim 18 as described in the 103 rejection above.

The Chang et al., Goris and Wuescher et al. and Pulspiher et al. does not explicitly disclose using eight Cartesian space octants.

However, Pulsipher et al. recognizes the ability to use the application for three dimensional images ("it will be appreciated that the same rules may applied to extend to three dimensions" at col. 6, line 42). Accordingly, as the Cartesian space is divided into quadrants in two dimensions, it follows that it is divided into octants in three dimensions.

Therefore, it would have been obvious at the time the invention was made to one of ordinary skill in the art to utilize the eight axis coordinate system of Pulsipher et al. to quantize the first and second derivative vectors of the Chang et al., Goris and Wuescher et al. combination as it "greatly increases the speed of a full code book search" (Pulsipher et al. at col. 1, line 44).

Response to Arguments

12. Applicant's arguments with respect to claims 1, 3-5, 7-9, 13, 15, 16, 22 and 23 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to KATRINA FUJITA whose telephone number is (571)270-1574. The examiner can normally be reached on M-Th 8-5:30pm, F 8-4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta can be reached on (571) 272-7453. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Katrina Fujita/
Examiner, Art Unit 2624

/Bhavesh M Mehta/
Supervisory Patent Examiner, Art Unit 2624